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THE EVOLUTION OF WAGE STATISTICS.

THE difficulty of presenting wage statistics in such a manner as to bring out the most valuable features involved is as great as, if not greater than, that attending the collection of the original information from which tables can be drawn; and the only improvement, or rather development, in the tabular presentation of wages has occurred within the past twenty years. An examination of hundreds of volumes of British, Continental, and American statistical works discloses the fact that until recently the simplest form of expression has prevailed, when wages have been referred to. In the last generation the difficulty was stated by Mr. G. R. Porter, in his remark, "No one, unless he shall have made the attempt to obtain information as to the rate of wages, can be aware of the difficulties opposed to his success"; and David Chadwick, of Salford, England, a most conscientious statistician, who quoted Mr. Porter in 1860, when treating of the rate of wages in Manchester and Salford, expressed still more emphatically the difficulty attending the collection of the data relating to wages. According to Mr. Chadwick, exact statistical returns relating to the rate of wages had been comparatively neglected; and he asserted that all writers on the subject had acknowledged the great difficulties which had beset their investigations and inquiries, and stated that these difficulties had been increased by the determination to record the number of hours of labor along with the average amount of wages in each trade. Continental statisticians have always found the same difficulty, of course; and American investigators have not been free from the obstacles encountered by their contemporaries.

The simple statement of the rate of wages paid in a certain trade at a certain time is as far as writers dared to go. This expression prevails all through Thorold Rogers's great work, *Six Centuries of Work and Wages;* and yet Professor Rogers felt reasonably sure that his statements as to the rate of wages were correct, and that his conclusions, based upon such simple averages as he uses continually, were fairly correct. He could get no farther than to state, for illustration, that a head-mason got 4*s*. per week for nine months in the year, and the others 3*s*. 4*d*. for ten months, while for two months the under-masons got 2*s*. 10*d*. This in 1449–50, at Oxford. Mr. Chadwick, in 1860,* stated wages and hours of labor weekly; as, for instance, in a table relating to silk and other manufacturing trades, he says, "Mill men and throwsters receive 17*s*. per week; overlookers, 22*s*.; spinners (young men and boys), 10*s*.; winders (women), 7*s*.; cleaners (women and girls), 6*s*.; with the hours of labor at 60 per week." But he gives no hint as to the number of men and women or girls and boys employed in the separate subdivisions of labor. He does not even give an average in the table referred to. And an examination of the exceedingly valuable report of Dr. Giffen, made in 1887 and entitled *Returns of Wages Published between* 1830 *and* 1886, shows that he found in official reports no more elaborate statements than that just quoted from Mr. Chadwick, except in some cases Dr. Giffen gives the range of wages,—as, for instance, brickmakers are quoted in a table as receiving from 21*s*. to 26*s*. per week; but in the whole 437 pages of the very valuable report referred to there is no attempt at showing the number of persons receiving a particular wage, nor has any English statistician, so far as I am aware, presented any classification of wages. It should be remembered that the attempt at the collection of industrial statistics by any systematic method has only received attention in Great Britain in very recent years. In fact, England has no industrial census; and its Correspondent of Labor, attached to the Board of Trade, and whose office corresponds in some respects to our American bureaus of labor, has not yet had the means given him to make any well-defined investigations into industrial matters. On the continent of Europe the same lack is observable. The best work which has been done there so far, in relation to wage statistics, is found in the efforts of Dr. Luigi Bodio, of Italy, in the *Annali di Statistica* for 1888, and is shown in the following table:—

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* *Journal of Royal Statistical Society*, March, 1860.

FOUNDRY FOR CASTING IRON AND OTHER METALS, UNDER TITLE OF JOSEPH POCCARDI & CO., TURIN, ITALY.

Distinction of the workmen by occupation.	Wages daily in francs and centimes during 1886.	Approximate number of the workmen.	Distinction of the workmen by occupation.	Day wages in francs and centimes.	Approximate number of the workmen.
Engaged at keeping count. (*a*)	Highest, 2.00	2	Smiths at the bench, pattern-makers, castings-cleaners, storers.	Highest, 4.00	12
	Medium, 1.50	2		Medium, 3.00	30
	Lowest, 1.00	2		Lowest, 2.00	24
Engaged at the furnaces.	Highest, 3.00	2	Laborers.	Highest, 3.00	3
	Medium, 2.50	2		Medium, 2.25	70
	Lowest, 2.15	2		Lowest, 2.00	2
In the foundry. Foremen 2.50 (*a*)		3			
In the foundry. workmen.	Highest, 6.00	10	Boys or apprentices.	Highest, 1.75	16
	Medium, 4.00	43		Medium, 1.00	20
	Lowest, 2.00	73		Lowest, 0.50	9

Hours of labor daily, generally 10½.

Number of days actually worked during the year, about 305.

Manner of payment,—accountants and foremen, monthly; the others, weekly,—all invariably in cash.

All the employees work by the day with the exception of the moulders, one-third of whom work by the piece, thus making about 50 per cent. more wages. The piece-workers belong to the class whose earnings are set down in the tables as medium and minimum.

On holidays work generally closes at noon. To make up for this, about a third of the employees work an extra hour or add an hour's work to the ordinary work-day. The extra wages earned by them in this overtime is estimated to amount to about 20,000 francs a year, corresponding to an average of 61 francs per man.

(*a*) indicates that these salaries are paid monthly to the accountants and the foremen.

Dr. Ign. Grüber, writing in the *Statistische Monatschrift* (Austria), vol. 15, 1889, page 339, on "The Method of Taking Statistics of Wages," in referring to the foregoing table and those accompanying it, which are of the same form, states that "in the fine-drawn methods of the modern Italian statistical school the statisticians are endeavoring to arrive at facts by singling out individual establishments," and then, referring to a well-known firm who had afforded an opportunity to study their composition of force and the rates of wages paid, says that "this company possesses an important machine-manufacturing establishment, with foundries for iron and metals," and that they gave the statisticians their weekly pay-rolls covering an entire year, embracing from September 5, 1886, to September 3, 1887. "With these opportunities," says Dr. Grüber, "the statistical office was able to see and recognize the necessity of having access to the wage-lists during the entire year, because it thus became apparent that the number of people employed, as well as their wages, was very variable, according to the seasons of the year; but, what is still more important, it became apparent that a corresponding individualization of the earnings took place within this category. This means that a differentiation of the earnings of individuals in one and the same category of employees, or work people belonging to the same class, occurred in the proportion of 100 to 33." The writer quoted then refers to a supplemental work under the Italian office, by which one hundred establishments were investigated in the same way that the one referred to had been studied; and he uses the following significant language: "The material thus gathered is now published and lies before us. It is rich in information; but its force is especially seen in its intrinsic merit, since it is critically tested and proved. No other statistics to our knowledge offer anything better."

A writer, in an article on statistics of wages published by the Dutch Statistical Institute * in its contributions for 1886, deals with wage statistics in several forms, but mostly in the simple old way that characterizes all such statistics prior to the last ten or fifteen years. In the article, however, there is a table showing the wages paid in various employments for a series of years, which the writer has ascertained through his researches. A sample of his presentations is shown in the statement relative to machinists, as follows: —

MACHINISTS.

Years.	Total number of employees.	Average weekly wages. Florins.	Number receiving weekly wages stated.	
			Number.	Weekly. Florins.
1873	3	12.66	2	12.00
1874	101	13.00	40	14.00
1875	215	11.68	76	10.00
1876	131	12.22	60	12.00
1877	43	11.70	15	10.00

By this little statement it is evident that the writer referred to was struggling with the effort to show in some better way than had been done before, not only wage statistics, but the concentration of numbers on different rates. The table is to be read in this way: For 1874 the 101 machinists considered by the writer received an average weekly wage of 13 florins. 40 of the number, however, received 14 florins per week. This shows where the general concentration would be found, 40 per cent. out of the whole number given for the year 1874 receiving 14 florins weekly.

In a recent work, *Lohnverhältnisse in Berlin*, one of the most voluminous publications on wages outside the

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* *Bijdragen van het Statistisch Instituut*, No. 2, 1886.

English language, there appear some interesting wage statistics. The Berlin Bureau made inquiries of manufacturers and of workingmen's associations or corporations as to the highest, lowest, and average wage paid in various occupations, and the results are stated in the publication named; but it is evident that the wages given were not calculated by the bureau, and that the presentation is given separately for each reply. No division is made between replies as coming from manufacturers and those from workingmen's corporations. The chief value of the tables for the present purpose is to show the effort of the German statisticians to secure wages that shall give something more than the mere rates.

These experiments show the extent to which European statisticians have gone in the development of wage statistics. Whether they have been in advance or behind our American statistical work in this direction will be seen. They have paid closer attention to revenues, commerce, finance, vital statistics, population, and those lines of statistical inquiry which result from the recording of continuous events rather than purely industrial studies; and they have treated matters connected with wages more upon the basis of observation or estimates than upon actual and exact statistical inquiry, for one of the latest and most interesting writers, Dr. August Meitzen, professor at the University of Berlin, in his *History, Theory, and Technique of Statistics*,* when speaking of estimates, states that "consumption and production, wages and prices charged by mechanics, small traders, carriers, etc., are susceptible only of estimate."

While the American statistician has had everything to learn, so far as the science of statistics is concerned, from the distinguished men who have prosecuted their studies in Europe, and who have taught the science in European universities, and cannot hope to surpass them in the fine development of the science, he has been unable to learn anything from them relative to industrial statistics.

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* Translated by Dr. Roland P. Falkner.

In America organized statistical inquiry, and, in fact, organized statistical work under government control, so far as original inquiry is concerned, belongs, with the exception of the federal census, entirely to the present generation of men. With the establishment of bureaus charged with the collection of information relating to the industries of the people, wage statistics, as a natural consequence, began to receive special attention, and the purpose of the present inquiry is to determine the lines along which wage statistics have developed, the reasons therefor, and the value of the changes which have occurred; and, in following this study, I might be excused, perhaps, if I based all that I have to say on the experience of the two statistical offices with which I have been connected, — the Massachusetts Bureau of Statistics of Labor and the United States Department of Labor. For this experience covers the whole range of methods of presenting wage statistics, the Massachusetts Bureau of Statistics having been the first office of its kind in this country or in the world. When that office was instituted, there were no models in industrial statistics in any direction. My distinguished predecessor in Massachusetts, General Henry K. Oliver, in his First Report, recognized the difficulties of the new field on which he had entered; and he used in that report the following significant language: "Here we found ourselves in a field to us entirely new and unexplored, the boundaries of which we could not then (nor can we now) perceive by any telescopic power at our command. Nor was there path or landmark, nor any precedent of former explorer here, at home, to guide us. We have had to tentaculate our way step by step, often in doubt, at times feeling that we might be wrong, and must return and take a new departure, sometimes bewildered by diversity of counsel, and sometimes anxious lest variety of views among the friends of a true labor reform might disconcert all effort after success." General Oliver might have said that the field was unexplored everywhere, and that there were no landmarks nor any precedent of former explorer either abroad or at home. Statisticians had indeed, from a professorial point of view, laid down a few principles as the outgrowth of their studies; but they had not been called upon to handle labor statistics. They had taught the difference between averages and arithmetical means, and some of the leading principles of statistical science; but, in treating wages, as I have said, they had simply given rates without regard to numbers employed, or time, or the differences in rates. If Mr. Porter, Mr. Chadwick, and other British statisticians, as well as Dr. Bodio, Dr. Meitzen, and all the brilliant line of continental statisticians, had found inherent difficulties, not only in the collection of wage statistics, but in their presentation, how much greater were the difficulties to be met in this country, with its varied industry! Fifty years ago industry was carried on on a simpler basis than now. One hundred years ago, and back of that, a rate of wage quoted for an industry might be sufficient; but the difficulties which meet the modern investigator have been increased many-fold.

Wage statistics have largely been presented on the basis of averages. Unfortunately for the scientific side of statistics, these averages have been too often the result found by taking the rate of pay per day, per week, or per month of men employed in specific occupations, and from such rates, and the estimated average number of men, deducing average yearly earnings or average weekly earnings. For certain economic purposes such an average is passably indicative of what might be earned and of the general wage-earning power in given industries. Of late years the demand has been that the employees should be classified, not only minutely as to occupations, but as to rates of pay and time employed. An unavoidable difficulty accompanies all great calculations of wage statistics, such as are found in our State and federal censuses. Employers are called upon to return the number of persons employed. Until the Massachusetts census of 1885 the census form of the question was very simple, and the vagueness of the information resulting from such an inquiry becomes apparent. So the attempt has been made to secure a more specific and exact statement as to the number of persons employed than would be the result of the question broadly asked, "The number of persons employed?" Recent attempts have been to seek specific exactness through the division of the question, employers being asked to state the greatest number employed at any one time, the least number, and the average number; and in some instances they have been asked to state the number employed on a certain date, and also at what time in the year the greatest number was employed, as well as the time of the employment of the least number. These subdivisions, while showing the fluctuations of employment, do not help in ascertaining true average wages. A fairly accurate statement could be derived from census returns as to the aggregate wages paid in a State or an industry or in the whole country; and it has been the custom of census-takers, writers, and speakers to divide the aggregate amount of wages paid in a given instance by the average number of persons employed under the same circumstances. While such a quotient has some value when brought into comparison with quotients derived at other times, the viciousness of such a process has only been shown in recent years, but so often and so clearly now that statisticians are endeavoring to obviate the difficulties and arrive at some approximately exact results. One sees without much study that by dividing the sum representing the aggregate wages paid by the number of persons employed, the divisor is very sure to be a fluctuating one, especially when the attempt is made to compare two periods of time; for in the one it may occur that the divisor represents the largest number of employees, while at another period it may represent the average number or least number of persons employed during the year.

To overcome these obstacles in the way of securing an actual quotient or a true quotient, many writers have insisted that there should be a perfect classification as to individual employees, in order to show how many there are above certain given points or below such points.* The difficulties, however, increase as attempts are made to approach more nearly to the truth. These difficulties belong to the conditions of industry. Supposably, it is a very simple thing to find out the number of men, their daily rates of pay, etc., in a large works or factory. Practically, if one desires to be scientifically accurate, this is almost impossible of accomplishment. Some of these difficulties may be stated here. A workman not only may, but quite often does, work at more than one occupation within a given period. This is probably caused in a great measure by the absence of some through illness or other causes, when, of course, others fill the vacancies, or a readjustment of duties for the time being takes place in order that the establishment may continue its functions. It is not rare for a man to work at several occupations within a year. Although these are not distinctive trades, like the carpenter's and the blacksmith's, but are occupations whose duties are quickly learned, yet in many instances they constitute the great bulk of labor. It may occur in the case of a single man that one of these occupations is manifestly his principal one; that is, the one for which he was hired. As to the others, he has probably worked at them as he was called upon to supply the places of the absent. When his occupation is thus changed, his rate of pay ordinarily changes to that of the new occupation. Commonly, as the occupations will not differ much in the degree of skill required, the rate of pay will not vary greatly; but the subsidiary places will usually have a higher rather than a lower rate, and the workman may eventually advance permanently into one of the higher positions. Again, while remaining in the same occupation, he may be promoted to a higher rate of pay, as there may be several rates for the same occupations, each advancing rate representing higher skill or larger industry and attention.

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* See Fifth Annual Report United States Commissioner of Labor.

Piece-workers or employees who are paid by the quantity are the cause of many difficulties in wage statistics. The pay-rolls of a works sometimes show only the amounts paid to the workmen, no record being made of the time or number of pieces the pay represents. Often, however, the number of pieces is also shown, and the rate per piece. If the books of the foreman, or time-keeper, are referred to, they may show the time, but not necessarily, in spite of his designation as time-keeper; for in a coal mine they will often only show the successive dates at which the time-keeper credited the workman with the tons of coal mined. The miner may have worked all or only a part of the time between these dates, or all of a day or but part of a day. The output credited to him may be the result of his own labor simply, or it may have been contributed to by a half-grown son or a helper. The time-keeper knows nothing of this, and cares nothing about it. So, ordinarily, in any industry.there will be much difficulty and even an impossibility in determining the time of piece-workers. Again, certain important employees work in gangs, crews, turns, shops, etc., different industries having different terms. The method of payment in such cases is as various as the terms used, and is not universally alike in any one industry. As an instance, let us suppose that work goes on continually night and day for five and a half days each week. Two crews, each working a turn of twelve hours, will be necessary, known respectively as the day crew and the night crew. For an iron works the composition of each will be about as follows: one roller, one heater, two roughers, two scrapers, one poke-in, two straighteners. These crews alternate in day and night work each week, each crew doing day work one week and night work the next. A record is kept of the number of pounds of iron rolled by each crew. Let us suppose that wages are paid once in two weeks. These wages are paid to one of the rollers, who is known as the chief roller; and the pay-rolls of the company show no recognition of the other persons in the crews. The amount paid this chief roller will be a certain sum per ton for the whole amount of finished product. He now proceeds to divide this amount among the men. It is to be presumed that the amount of product of one crew will be somewhat larger than that of the other. So each is considered separately. Of the amount due to his own crew, he pays one-fourth to the heater and one-eighth to each of the roughers. He pays the scrapers, straighteners, and poke-in a fixed sum per day, each class being at a different rate. The other crew is paid off in a similar way, what the heater and rougher gets being based on the product of the crew. He pays the other roller usually a fixed sum per day. After making all these payments, what is left belongs to himself. It may be presumed that the chief roller does not concern himself with keeping a permanent record of these transactions; and, as the only record the mill has is of the tons of product of each payment period and the amount paid the chief roller, and as the composition of the crews is changing from time to time, and the number of turns of work in a month varying at different seasons, the difficulty of ascertaining the number of days of work done and the earnings of each person in a year is great. Of course, in the case of piece-workers, when the time is obtainable, there will be, in a computation for a day, as many rates as there are individuals, which is an embarrassment in the way of exactness.

There are also employees who work by the hour at one occupation conjoined with piece-work at another, or a certain class of labor which is performed by the hired workmen of one establishment, in another is let out to a contractor who hires his own help; and the establishment has no record of anything but the amount paid this contractor. It is apparent, then, that, after the tedious labor of copying a pay-roll has been performed in order to secure a perfect classified statement, it may be found that the material is quite incomplete.*

All these difficulties, and many more, beset the collector of information relating to wages, and it is not surprising that all who have had anything to do with such investigations have made mistakes, have been ready to adopt the simplest form of expression, and have fondly clung to the use of averages; and yet, with all these difficulties, I believe that the development of wage statistics, or the improvement in their presentation, has not only been very great, but satisfactory, and is approaching a systematic and generally adopted method in this country. One of the most essential primary objects of statistics is to secure a simple, concrete statement of a mass of facts the essence of which could not be expressed except through long and tedious descriptive language. So the efforts made at times to secure exact mathematical accuracy in statistical presentation defeats the primary object, and compels the student to undertake laborious calculations or study to enable him to comprehend the truth. This scientific difficulty has met the statistician, and supplemented the inherent difficulties in the collection of his facts on wages. So, with a few exceptions, all the American works have been confined to the old simple statements of the European documents; but they have,

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*** See Sixth Annual Report United States Commissioner of Labor.**

as I have said, taken more affectionately to averaging than have their European contemporaries. I am glad to recognize that they are now stepping out of such methods and into a field which bids fair to bring great success in wage presentations.

The first step was made in 1872, by General Oliver, in his Third Annual Report from the Massachusetts Bureau. In that report, page 93, he gives a table of the wages of women in some of the jewelry establishments at Attleboro. The table is as follows: —

JEWELRY.

Occupation.	Number of women earning per week			
	Under $4.50.	$4.50 to $7.00.	$7.00 to $9.00.	$9.00 to $13.00.
Clocks, ...	29	24	32	—
Gold chains, . .	—	—	24	4
Gold leaf, . . .	8	42	—	—
Gilding and stamping, . .	36	—	29	—
Jet-work, . . .	38	26	35	—
Silver plating, .	20	30	85	54
Spectacles, . . .	—	18	47	—
Thimbles, . . .	15	43	15	—
Watches, . . .	—	14	145	90
Totals, . . .	146	197	412	148

Total number employed, ...	903
Average wages per week, ...	$7.43
Average hours of labor, ...	10
Average number of weeks of busy season, . .	45
Average price of board, ...	$4.50
General average earnings per year, . . .	$334.35

Singularly enough, General Oliver did not use this form of table in his subsequent report, nor had he used it in any previous report, although in his Second Annual Report, that for 1871, in giving the wages of saleswomen in 293 establishments, he had indicated the principle involved in the table just given, the table of 1871 being as follows: —

WAGES OF SALESWOMEN.

Number employed.	Wages per week.	Number employed.	Wages per week.
58	$12.00	440	$7.00
90	10.00	304	6.00
36	9.00	116	5.00
242	8.00	256	4.50

Number of establishments visited, . . .	293
employees, ...	1,542
Hours of labor, about, ...	10 to 11

In the same report, that for 1871, occur several other tables on the same principle, although somewhat more extensive. In the first table given above the true principle of showing wages in a classified form, with the number of persons receiving wages at a given grade, is clearly shown. It did not attract much attention, because there were no working statisticians to be attracted; and so the principle did not get fixed to any extent, even in the bureau where it was first used. In 1875 the same general features of a wage presentation were incorporated in a report relating to Income and Relative Surplus of Workingmen, but this applied to families and not to individuals. It will be found in the Sixth Annual Report of the Massachusetts Bureau, page 380, and is as follows: —

GRADATIONS OF INCOME AND RELATIVE SURPLUS.

Gradations.	Number of families.	Their earnings.	Their expenses.	Average yearly surplus or debt.
$300 to $400	3	$1,078.00	$1,177.30	$33.10
400 " 500	7	3,230.00	3,289.00	8.43
500 " 600	48	26,617.79	26,863.93	5.18
600 " 700	92	60,066.50	59,159.58	9.86
700 " 800	110	82,905.50	80,677.62	20.25
800 " 900	71	60,375 70	58,069.49	32.48
900 " 1,000	38	36,083.00	33,887.67	57.77
1,000 " 1,100	16	16,625.00	15,832.77	49 51
1,100 " 1,200	4	4,758.00	4,334.80	105.80
1,200 " 1,300	4	4,971.00	4,453.61	129.35
1,300 " 1,400	2	2,733.00	2,389.00	172.00
1,500 " 1,600	1	1,537.00	1,308 25	228.75
Above 1,800	1	1,820.00	1,544.20	275.80
Totals,	397	$302,800.49	$292,987.22	$24.72

By the foregoing table one can see at a glance where the weight of numbers by the gradation of pay is heaviest. This table was the last appearance of the classified wage principle until the Fifteenth Annual Report of the Massachusetts Bureau,—that for 1884,—in which the principle was carried out to a considerable extent in the part relating to the working-girls of Boston. A step in advance however, was made in the last-named report; for the present actual weekly earnings were given on a classified basis, the classification extending from $1 per week to $35, $1 representing the difference in the gradations. The following is the table used in 1884, as described: —

PRESENT ACTUAL WEEKLY EARNINGS.

Classification.	Personal service.	Trade.	Manufactures.	Aggregates.
Under $1.00, . .	1	—	—	1
$1.00 to 2.00, . .	1	—	8	9
2.00 " 3.00, . .	2	13	24	39
3.00 " 4.00, . .	6	18	57	81
4.00 " 5.00, . .	19	16	123	158
5.00 " 6.00, . .	15	11	164	190
6.00 " 7.00, . .	15	19	137	171
7.00 " 8.00, . .	6	22	103	131
8.00 " 9.00, . .	7	11	69	87
9.00 " 10.00, . .	—	3	51	54
10.00 " 11.00, . .	5	7	38	50
11.00 " 12.00, . .	2	1	14	17
12.00 " 13.00, . .	2	1	15	18
13.00 " 14.00, . .	—	—	5	5
15.00 " 16.00, . .	1	1	6	8
16.00 " 17 00, . .	—	—	3	3
18.00 " 19.00, . .	1	—	5	6
20.87, . .	—	—	1	1
22.94, . .	—	—	1	1
31.90, . .	—	—	1	1
35.00, . .	—	—	1	1
Totals, ...	83	123	826	1,032

This table brings out all the benefits of a classified statement, and shows exactly where the weight of numbers is to be found relative to earnings per week,—as, for instance, out of the 1,032 women involved in the table, 190, or the largest number at any one grade, received from $5 to $6 per week; but the greatest each side of this number can be easily added together, which would show that the great mass received from $4 to $8 per week.

Since 1884 the form of presentation exhibited in the foregoing table has been constantly in use in the Massachusetts office; and the schedules for the State Census of 1885, so far as the wages of manufacturing establishments were concerned, called for wages on the classified basis, the questions on the schedule being as follows: —

WAGES PAID IN GENERAL.

109. Total amount paid in wages in this establishment during the *month* ending June 30, 1885.	To persons,	$
110. Total amount paid in wages in this establishment during the *year* ending June 30, 1885.	To persons,	$

111. Specified wages paid for the last week in June, 1885, in this establishment.	**112.** No. receiving such wage.		**111.** Specified wages paid for the last week in June, 1885, in this establishment.	**112.** No. receiving such wage.	
	Males.	Females.		Males.	Females.
Under $5			Over $9, under $10		
Over $5, under $6			Over $10, under $12		
Over $6, under $7			Over $12, under $15		
Over $7, under $8			Over $15, under $20		
Over $8, under $9			Over $20		

In addition to the foregoing inquiries relating to wages paid in general, this schedule of the Census of 1885 had various queries showing the relation of wages to cost of production and to wages paid in detail,— as, for instance, in all classes of subdivided occupations, whether paid by the day or piece, with distinctions as to sex, number, age; basis of pay, whether by the hour, day, or week, and the amount paid. These inquiries were intended to develop all the necessary and scientific features of wage statistics, and the results have proved the value of the inquiries. Under the classification of wages derived from the questions printed above, a report by industries reveals at once the exact wage condition of the employees in each industry comprehended. This is shown by one illustration, which is sufficient for the present purpose; and that relates to cotton goods: —

COTTON GOODS.

Classification of weekly wage.	Number of persons receiving specified wage.		Percentages.		Both sexes.	Percentages.
	Males.	Females.	Males.	Females.		
Under $5, ...	6,298	13,004	28.61	49.70	19,302	40.06
$5, but under $6,	3,186	6,264	14.47	23.94	9,450	19.61
6, " " 7,	2,956	4,177	13.43	15.97	7,133	14.81
7, " " 8,	2,905	1,979	13.20	7.56	4,884	10.14
8, " " 9,	1,945	488	8.83	1.86	2,433	5.05
9, " " 10,	1,741	148	7.91	0.57	1,889	3.92
10, " " 12,	1,363	52	6.19	0.20	1,415	2.94
12, " " 15,	769	13	3.49	0.05	782	1.62
15, " " 20,	577	23	2.62	0.09	600	1.25
20 and over, . .	275	15	1.25	0.06	290	0.60
Totals, . . .	22,015	26,163	100.00	100.00	48,178	100.00

By this table the concentration of labor at any point is readily ascertained. Out of the 22,015 males covered by it, it is seen at once that 6,298 received less than $5 per week; and that, out of 26,163 females, nearly one-half, or 13,004, being 49.70 per cent. of the whole number of females, were paid less than $5 per week. But by this method all the industries of a State can be grouped and graded as to wages; and the following short table shows the grouping of certain establishments in Massachusetts under the Census of 1875, which covered 248,200 employees: —

ALL INDUSTRIES.

Classification of weekly wage.	Number of persons receiving specified wage.		Percentages.		Both Sexes.	Per-centages.
	Males.	Females.	Males.	Females.		
Under $5, . . .	15,713	25,401	8.99	34.59	41,114	16.57
$5, but under $6, .	8,482	14,719	4.85	20.04	23,201	9.35
6, " " 7, .	11,829	13,445	6.77	18.31	25,274	10.18
7, " " 8, .	14,663	7,920	8.39	10.79	22,583	9.10
8, " " 9, .	12,612	4,411	7.22	6.01	17,023	6.86
9, " " 10, .	19,596	3,122	11.21	4.25	22,718	9.15
10, " " 12, .	23,961	2,356	13.71	3.21	26,317	10.60
12, " " 15, .	33,847	1,307	19.37	1.78	35,154	14.16
15, " " 20, .	27,076	485	15.49	0.66	27,561	11.11
20 and over, . .	6,987	268	4.00	0.36	7,255	2.92
Totals, . . .	174,766	73,434	100.00	100.00	248,200	100.00

By this table it is learned that, of the whole number involved, 16.57 per cent. of both sexes received under $5 per week, the distribution, however, throughout the whole range of the grading being fairly equal. If we turn to the columns of males and females, however, we find that the distribution reverses; for instance, 8.99 per cent. of the whole number of males received under $5 per week, the concentration being from $9 per week upward, while in the column for females we find that the larger number received under $5 per week, being 34.59 per cent., and the concentration practically ceases at $8 per week.

This method of presentation is thus seen to be exceedingly valuable, and supplements in a scientific way the ordinary statement of wages by averages. The form of inquiry referred to as having been adopted in the schedules of the Census of Massachusetts for 1885 is now embodied in the schedule for the annual statistics of manufactures for that State.

Contemporaneously with the work of the Massachusetts Bureau in 1885, the Bureau of Labor Statistics for the State of Michigan, in its Second Annual Report, published February 1, 1885, under the direction of John W.

McGrath, at that time Commissioner of Labor, presented some tables involving clearly the principle of classification. A fair sample of this table, found on page 220 of the report named, is given: —

Daily rates.					No. of persons receiving	Gross No. receiving	Amount received daily.	Gross amount received.	Av'age daily wages.
From	$0.25	to $7.00,	both	inclusive,	—	6,939	—	$12,312.30	$1.77+
"	3.15	" 7.00,	"	"	144	—	$554.70	—	3.82+
"	2.50	" 3.00,	"	"	713	—	1,900.70	—	2.66+
"	2.10	" 2.35,	"	"	344	—	773.90	—	2.24+
"	1.00	" 2.00,	"	"	5,572	—	8,967.10	—	1.60+
"	0.25	" 0.90,	"	"	166	—	115.90	—	.69+
Totals, ...					6,939	—	$12,312.30	—	—

Mr. A. Blue, Secretary of the Bureau of Industries for the Province of Ontario, Canada, in his Seventh Annual Report, that for 1888, uses very effectively the form of table just described, and shows how the classification is adaptable to a number of places at the same time that he shows the number employed in the various places at the different grades of wages. The table is as follows: —

Schedule.	$6.00 and und'r	$6.00 to $7.50	$7.50 to $9.00	$9.00 to $10.50	$10.50 to $12.00	$12.00 to $13.50	$13.50 to $15.00	Over $15.00	Total.
With dependants:									
No. of workers, . .	82	275	426	411	373	70	124	96	1,857
Average wages, . .	$5.85	7.27	8.71	10.11	11.66	13.01	14.75	18.02	10.32
Days employed, . .	266	273	274	271	269	275	261	217	268
Without dependants:									
No. of workers, . .	183	133	178	90	71	13	14	15	697
Average wages, . .	$5.02	7.23	8.68	10.10	11.65	12.82	14.82	17.67	8.32
Days employed, . .	289	275	272	272	269	236	223	188	273
Total males over 16:									
No. of workers, . .	265	408	604	501	444	83	138	111	2,554
Average wages, . .	$5.28	7.26	8.70	10.11	11.66	12.98	14.76	17.97	9.77
Days employed, . .	282	274	273	271	269	269	257	213	269

In his report for 1889 Mr. Blue carries his classification still further, and compresses into a very short table a variety of facts. These facts he works out from the statistics of employees who made returns of wages earned, time employed, and cost of living for the whole year; but he can only put into one table the number in each range, the weekly wages paid, a specific number of grades, the days employed in each grade, the yearly wages, and the average daily rate and extra earnings. The table is so valuable as an example of what can be done when study is put into wage statistics that it is given herewith: —

Schedule.	$5 and und'r	$5 to $6.	$6 to $7.	$7 to $8.	$8 to $9.	$9 to $10.	$10 to $11.	$11 to $12.	$12 to $13.	$13 to $14.	$14 to $15.	Over $15.	Total
No. in range, . . .	386	308	240	637	757	392	352	391	56	63	109	123	3,814
Weekly wages, . .	$3.86	5.95	6.84	7.65	8.91	9.87	10.62	11.93	12.60	13.57	14.96	17.83	8.98
Days employed, . .	275	276	278	272	272	275	272	264	272	261	249	236	270.6
Yearly wages, . .	$176	274	312	344	400	440	470	516	559	583	604	685	395
Average daily rate,	$0.65	.99	1.12	1.26	1.47	1.60	1.73	1.95	2.06	2.23	2.42	2.90	1.46
Extra earnings, . .	$5.87	14.03	22.18	20.93	16.64	16.88	14.51	12.49	13.52	10.94	8.70	8.54	15.18

Following this table, Mr. Blue shows a classification by ranges in still greater detail, under the general heads of workers with dependants and workers without dependants; but the table is too long for insertion. Our statisticians will find themselves well repaid by studying this table, which is to be found on page 39 of Mr. Blue's report for 1889.

Mr. Samuel M. Hotchkiss, the Commissioner of Labor for Connecticut, who puts his practical ingenuity into his reports, has adopted fully the classified wage presentation. He has, however, shown another variation which can be introduced, and in a very brief form; for he introduces a classification by ages, which might be extended to almost any degree. One table from his valuable report for 1888 will suffice to show the method adopted by him. This relates to certain establishments in the woollen industry in the State of Connecticut, and brings out not only the gradations of earnings by males and females under and over eighteen years of age, but for two years, 1860 and 1887 : —

WAGES LAST WEEK IN JUNE, 1860 AND 1887.

Woollen.

Rate per week.	Males.				Females.				Total 1860.	Total 1887.
	Under 18.		Over 18.		Under 18.		Over 18.			
	1860.	1887.	1860.	1887.	1860.	1887.	1860.	1887.		
Under $5, .	2	101	29	25	15	81	15	66	61	273
$5 and under 6, .	—	39	10	42	—	90	3	114	13	285
6 " " 7, .	—	22	23	123	—	—	4	127	27	272
7 " " 8, .	—	—	7	109	—	1	1	123	8	233
8 " " 9, .	—	1	8	74	—	1	1	61	9	137
9 " " 10, .	—	—	11	189	—	—	—	10	11	199
10 " " 12, .	—	—	1	139	—	—	—	45	1	184
12 " " 15, .	—	—	5	94	—	—	—	2	5	96
15 " " 20, .	—	—	1	43	—	—	—	—	1	43
20 and over, . .	—	—	—	19	—	—	—	—	—	19
Totals, 1860,	2	—	95	—	15	—	24	—	136	—
Totals, 1887,	—	163	—	857	—	173	—	548	—	1,741

Colonel John S. Lord, of the Bureau of Labor Statistics of Illinois, in his Sixth Biennial Report, that for 1890, has adopted the classified basis, and finds that he is able to present facts relating to wages that could not be presented by any other form; and the Michigan Bureau, in its Eighth Annual Report, that for 1891, summarizes the number of employees in the industries covered by the report on the classified basis. The same is true of the Bureau of Labor Statistics of the State of Missouri, which in its Twelfth Annual Report, that for the year ending November 5, 1890, has adopted the classified basis; and Mr. Betton, in the Sixth Annual Report of the Bureau of Labor of Kansas, has some admirable tables, showing the number reporting by different industries and the average daily pay by classified grades,— and not only this, he gives union and non-union wages in the same table. In this the adaptability of the classified wage-table is shown to a still greater extent.

All of the foregoing illustrations have been drawn from the reports of the State bureaus named. As each of those not named pay more attention to wage statistics as their experience grows with their years, the classified wage-table will be adopted.

Turning from the State offices to the federal government, an examination of the reports of the census and of the Department of Labor on industrial statistics reveals some interesting developments in wage statistics.

Mr. Joseph D. Weeks, who had charge of wage statistics under the Tenth Census, has performed much admirable service in the development of such statistics. Vol. XX. of the Tenth Census, which was prepared by Mr. Weeks, has for its purpose a comparison of the wages at different periods, the statistics running back as far as manufacturing establishments were able to supply data. In the main, the statistics in this volume are averages. Mr. Weeks stated in his letter of transmittal that he believed that the figures given in the tables fairly represented the average wages paid in the different industries in different sections of the country for the years named in the various tables; and he took the greatest care to avoid all kinds of errors, and subjected his force to great labor in securing from manufacturers revisions of original statements, that the very best results might be secured. It was his belief — and in this belief he was warranted — that the rates which he did give fairly represented the wages paid for labor in an industry throughout the term comprehended, and that the tables furnished the means of obtaining a fair average for the whole country. The form usually adopted by Mr. Weeks is shown in the table at the foot of p. 174.

In all tables like this in the volume named, the attempt was made simply to furnish average wages. Unfortunately, it cannot be ascertained, from the volume itself, whether the averages are true averages or means. This probably makes but little difference, as in the ordinary method of securing averages an arithmetical mean and an average are quite alike, and at any rate, in such tables as the foregoing, not much difference would be noticeable. But Mr. Weeks appreciated the necessity of considering numbers as well as wages; and he has in several tables given the actual or true average daily earnings, as well as the number of employees receiving a given rate or range. This effort is shown in the table which follows: —

AVERAGE DAILY EARNINGS AND NUMBER OF EMPLOYEES AT CERTAIN OF THE FLINT-GLASS WORKS OF THE UNITED STATES DURING THE CENSUS YEAR, 1880.*

Classes of Employees.	Pittsburg Dist., Pa. Glassware.		Classes of employees.	Pittsburg Dist., Pa. Glassware.	
	Number of employees of each class.	Average daily earnings.		Number of employees of each class.	Average daily earnings.
Managers, . .	1	$3.50	Mould-makers,	—	
Pressers, . .	4	3.50	Machinists, .	1	$2.00
Finishers, . .	2	2.00	Mixers, . . .	1	2.00
Gatherers, . .	25	1.75	Teasers, . . .	2	2.50
Stickers-up, .	15	1.00	Pot-fillers, . .	1	2.00
Cleaning-off boys	16	.80	Pot-makers, .	—	—
Carrying-in boys	4	.80	Clay-trampers,	—	—
Mould-holders,	1	1.50	Packers, . .	4	2.00
Blowers, . . .	17	3.50	Drivers, . . .	—	—
Cutters, . . .	1	3.50	Laborers, . .	1	1.50
Engravers, . .	—	—	Engineers, .	1	2.00

* From Tenth United States Census, vol. xx. p. 80.

WAGES PAID BY A PRESS BRICK COMPANY IN LOUISVILLE, KY.

Classes of employees.	Unit of payment.	Dates.					
		1880.	1879.	1878.	1877.	1876.	1875.
Foreman, ...	Day	$1.92⅓	$1.54	$1.92⅓	$1.92⅓	$1.92⅓	$1.92⅓
Moulder, ...	"	1.75	1.50	1.50	1.50	1.50	1.50
Off-bearer, ...	"	1.00	1.00	.80	.80	.80	.80
Pressman, ...	"	2.88½	2.88½	2.88½	3.84⅔	3.84⅔	3.84⅔
Setter, ...	"	2.00	1.50	1.50	2.00	2 00	2.00
Burner, ...	"	2.00	2.00	2.00	2.00	2.00	2.00
Laborer, ...	"	1.25	1.00	1.00	1.00	1.00	1.00

This table embodies the principles of a classified wage-table; but in Volume II., Reports of the Tenth Census, Mr. Weeks, in his monograph on the Manufacture of Glass, carried this matter of wage presentations to a still greater development than he did in Volume XX. In Volume II., as shown in the table below, he gives the

---

RANGE AND AVERAGE RATES OF DAILY WAGES IN THE MANUFACTURE OF GLASSWARE.

Classes.	Number	Range.			Average
Managers,	52	$3.00	to	$8.11	$4.46
Pressers,	306	2.00	"	5.00	3.53
Finishers:					
Males 16 years and upward,	563	.76	"	6.00	3.55
Males under 16 years,	134	.76	"	.80	.79
Gatherers:					
Males 16 years and upward,	890	.67	"	3.50	1.93
Males under 16 years,	6	.55	"	1.50	1.34
Stickers-up:					
Males 16 years and upward,	338	.42	"	1.80	.87
Males under 16 years,	543	.42	"	1.00	.78
Cleaning-off boys:					
Males 16 years and upward,	192	.50	"	1.35	.82
Males under 16 years,	414	.50	"	1.00	.64
Females 15 years and upward,	3			.80	....
Females under 15 years,	12	.50	"	.62⅔	.58
Carrying-in boys:					
Males 16 years and upward,	156	.48	"	1.20	.62
Males under 16 years,	762	.33⅓	"	.80	.56
Mould-holders:					
Males 16 years and upward,	132	.50	"	2.75	.83
Males under 16 years,	285	.45	"	1.00	.62
Blowers,	1,147	1.66⅔	"	5.00	3.47
Cutters:					
Males 16 years and upward,	223	1.35	"	4.16⅔	2.29
Females 15 years and upward,	7			.50	.50
Engravers,	33	1.66⅔	"	4.00	2.58
Mould-makers,	120	1.50	"	6.00	3.05
Machinists,*	30	1.50	"	6.50	2.30
Mixers,	135	1.33⅓	"	2.66⅔	1.76
Teasers,	166	1.50	"	2.66⅔	2.11
Pot-fillers,	56	1.00	"	2.50	1.67
Pot-makers,	41	1.16⅔	"	3.33⅓	2.35
Clay-trampers,	74	1.00	"	2.50	.43
Packers:					
Males 16 years and upward,	340	.60	"	4.00	1.72
Males under 16 years,	19	.45	"	.65	.53
Females 15 years and upward,	19	.50	"	2.33⅓	.98
Drivers,	103	1.00	"	2.50	1.72
Laborers:					
Males 16 years and upward,	573	1.00	"	2.00	1.35
Males under 16 years,	7	.67	"	.83	.69
Females 15 years and upward,	82	.60	"	.75	.67
Females under 15 years,	9	.50	"	.67	.61
Engineers,	54	1.16⅔	"	3.00	2.15

* The machinist receiving highest rate is probably a mould-maker.

classes of employees in the manufacture of window-glass, — for instance, the number in each class, the range of their daily wages, and the average daily wage; and by "average daily wage" he means an average obtained by multiplying each rate of wages by the number of persons employed at that rate, and dividing the sum of the products so obtained by the number of men employed. Thus the average given in the table on p. 175 represents the real average wages of the different classes as returned.

In the Report of the United States Commissioner of Labor for 1888, being the Fourth Annual, and relating to working-women in large cities, the classified wage-table was very freely used, and in the tables showing classified yearly earnings of working-women by graded sums there is incorporated the average number of days lost, and in subsequent reports, on railroad labor and other topics, the Department of Labor has continued the use of the classified wage principle; but the most extensive application of it has been under the Eleventh Census, in the schedule relating to manufactures. The General Schedule No. 3 of the Eleventh Census calls for a very complete statement as to wages. It comprehends all classes in the industrial establishments of the country,— classified as to males above sixteen years, females above fifteen years, and children. It requires the average number employed during the year and the total amount paid in wages during the year, but it calls for these facts by classes: that is, for the officers of corporations and members of firms; clerks and salesmen; watchmen, laborers, teamsters, and other unskilled workmen; piece-workers not included in the foregoing; operatives, engineers, and other skilled workmen; overseers, foremen, and superintendents other than general superintendents or managers. This is a grand advance on former census inquiries relating to wages, but there has been added to it a series of inquiries which will bring out the weekly rates of wages paid and the number of hands employed at each rate, excluding those employed on piece-work; and these are classified as males above sixteen years of age, females above fifteen years, and children, the concentration in the schedule covering this inquiry being as shown below: —

Rates per week.	Males above 16 years.	Females above 15 years.	Children.
Under $5.00, ...			
$5.00 and over, but under $6.00, ...			
6.00 " " " " 7.00, ...			
7.00 " " " " 8.00, ...			
8.00 " " " " 9.00, ...			
9.00 " " " " 10.00, ...			
10.00 " " " " 12.00, ...			
12.00 " " " " 15.00, ...			
15.00 " " " " 20.00, ...			
20.00 " " " " 25.00, ...			
25.00 " "			

This development in the method of presenting statistics of wages, valuable as it is, does not do away with the necessity of using averages. The average is a legitimate expression in a concrete way for many things that cannot be otherwise expressed; yet all statisticians who have given any study to their science will endeavor to avoid the use of the average, whenever possible. There is a great deal of condemnation of the average, and I cordially join in the condemnation; yet I cannot fail to see that there are times when the average wage must be resorted to as the only form of statement by which the approximate truth can be expressed. The difficulty lies in not distinguishing between a true average and an arithmetical mean. In the Fifteenth Massachusetts Report, 1884, not having sufficient data to warrant a purely scientific presentation of the facts collected, and feeling the necessity of making a concrete statement, I carried the use of the average to its highest point of utility. The facts were all correct, the methods of statement were proper, and could not be questioned until the final use of an average of averages. I should not have been justified in this use of an average of averages, had not all the details and my own observation in various directions proved to me that the resulting statements were very close to the absolute truth. The condemnation of such things usually comes in the form of a statement that "pigs and potatoes cannot be averaged"; or, as Dr. Richmond Smith, in his very valuable article on "Wage Statistics and the Next Census of the United States," which appeared in the *Quarterly Journal of Economics* for July, 1888, expresses it, "The wages of men, women, and children are entirely different quantities, and are as incapable of addition and averaging as a bushel of potatoes or a pound of butter."

This is carrying condemnation of the average to an absurd extreme. You cannot add a pound of butter and a bushel of potatoes together; but, if you have a bushel of potatoes to sell and a pound of butter to sell, you can add the value of these two things together, the value being an element rather than a quantity. So, too, a dealer in notions, who has a thousand or two thousand different articles in his store, can average his daily or weekly sales. He does not average his daily or weekly sales of things, but the values which he receives for the infinite variety of different things he offers. A farmer may raise half a dozen different crops, and at the end of four or five years he can add the values of his different crops together and find what the average value of all his crops is per year; but he cannot average the quantities of different articles taken together. So, in wages, the wages of men, women, and children can be added together, and they can be averaged legitimately; but such averages are only valuable when you wish to express an extreme result. Such an average is not scientific, but it is indicative of something. So when writers take the total number of people employed in the country, and divide that number into the total wages received, the resulting quotient is of some value, but not great, and is often vicious as used; but, used for a series of years or periods, it will show whether that widely diffused average is increasing or decreasing. For instance, if in 1850 that quotient showed for the United States $250, and the proportion of men, women, and children to the whole body of employees was given, and in 1860 the quotient was $300, and the proportion of men, women, and children also known, and in 1870 $350, and in 1880 $400, I contend that it has a value; for, if the proportion of women and children employed in the industries of the country is constantly increasing, as many claim, and the quotient showing the average receipts of all is constantly increasing also, then that quotient indicates positively an increased earning capacity on the part of the employed population. This is all it is worth, but it is worth this.

The best derived table, however, for comparative purposes is the classified wage-table, which has been so fully described and its development traced. It is only useful as a derived table; for, in all cases of wage statistics, the complete details should be printed, that other forms of derived tables may be drawn from them, so that comparisons can be made in various directions. But, while I believe the classified wage-table to be the best form of derived table for comparative purposes, it must be universally uniform if the best results of comparison are to be gained; and it is one of the most encouraging features of the wage presentations in this country that the different State bureaus and the federal offices are adopting practically the same classification. Yet great difficulties, notwithstanding the universal adoption of a classified wage-table, will appear in all wage statistics; and some of these difficulties and obstacles it may be well to point out.

In spite of the benefits and advantages to be derived from the classified wage-form, the average must be resorted to, as I have already indicated, in order to secure a truthful statement of wage conditions, and, to show this, I introduce a table drawn from the statistics of the wages paid on sixty systems of railroads in the United States, as shown in the Fifth Annual Report emanating from the United States Department of Labor. The statistics given in that report were the result of the tabulation of the actual pay-rolls for a whole year of sixty systems of roads, comprehending 241,910 employees. The table following shows, for certain occupations of railroad employees, what has been denominated in the report as "actual and theoretical conditions compared"; that is to say, for the occupations named in the table of the different employees on the whole number of roads, the total being 160,739, there is stated the total number of days which that body of employees actually worked, and the total amounts actually earned. Then in another column there is stated the average number of days employed and the average earnings, while the two right-hand columns show the conditions which would be necessary if the positions on the roads were filled continuously throughout a working year of 313 days, and the consequent average earnings, should this theoretical condition be experienced. The table opens a new line of thought and study in statistical science. See p. 181.

The necessity for the use of the average, in order to get at the truth underlying the wage conditions of a great body of employees, as shown in the foregoing table, is clearly brought out. One of the most interesting features which attracts the attention under a close examination of the table is the great variation between the number of men actually employed during a year as individuals and the number of men which would be necessary to accomplish like results, provided full time was worked by each. The 160,739 different employees, as classified by occupation in the foregoing table, performed $35,105,852 worth of labor during a year of 313 days. This was an average of 130 days to each employee, with average earnings of $218 for the year. If, now, 66,634 employees had worked the full 313 days in the year, they would have accomplished the same results that were accomplished by the 160,739 different employees, and would have received, instead of $218 each per annum, $527 each per annum. An examination of the table will show the variations as they relate to the different leading occupations in railroad labor.

ACTUAL AND THEORETICAL CONDITIONS COMPARED IN LEADING OCCUPATIONS OF SIXTY SYSTEMS OR ROADS.

Occupations.	Actual condition. Employees and results.					Conditions, if the necessary positions were filled continuously by the same employees through a working year of 313 days.	
	Different employees.	Total days employed.	Total earnings.	Average days employed.	Average earnings.	Necessary employees	Consequent average earnings.
Baggage-masters,	1,104	257.393	$419,147	233	$380	822.34	$510
Baggagemen, .	989	198,326	299,125	201	302	633.63	472
Blacksmiths, . .	1,435	296,581	650,237	207	453	947.54	686
Brakemen, . . .	20,117	2,277,566	4,054,246	113	202	7,276.57	557
Carpenters, . .	8,277	1.361,081	2,697,822	164	326	4,348.50	620
Conductors, . .	5.184	1,074,072	2,826,804	207	545	3,431.54	824
Engineers, . . .	2,974	705,700	2,275,838	237	765	2,254.63	1,009
Enginemen, . .	998	241,630	771,194	242	773	771.98	999
Firemen, . . .	5,717	887,419	1,593,918	155	279	2,835.20	562
Flagmen, . . .	1,989	409,463	462,951	206	233	1,308.19	354
Foremen, . . .	7,085	1,745,445	3,283.157	246	463	5.576.50	589
Laborers, . . .	89,429	8,744,811	11,036,805	98	123	27,938.69	395
Machinists, . .	4,506	869,219	1,896,321	193	421	2,777.06	683
Masons, ...	874	80,993	198,706	93	227	258.76	768
Painters, . . .	1.583	269,147	524,209	170	331	859.89	610
Switchmen, . .	4,262	748,112	1,125,967	176	264	2,390.13	471
Telegraph operators, ...	4,216	689,398	989,405	164	235	2,202.55	449
	160,739	20,856,356	$35,105,852	130	$218	66,633.73	$527

I have never seen this feature in any other statistical presentation. It shows a tendency of labor to migration, and this tendency is here brought out statistically on an extended scale. It is a new phase in the labor question, to be investigated and studied as time goes on.

In the report cited a statement is made for the whole number of employees working by time for the sixty roads investigated; and that statement shows that 224,570 different employees worked on an average 147 days in the year, earning $243 apiece, while 105,807 men working continuously would have accomplished the same results, and earned $515 per annum each. Such statistics cannot well be used for comparative purposes, although the classification of details from which such a table as that just given is drawn would offer the best possible opportunity for comparative purposes. This opportunity for comparison is shown in the following short table, showing the groups of actual daily earnings, or daily rate nearest average daily earnings, of employees engaged in constructing roads, tracks, etc., on the railroads investigated, as described above: —

Employees constructing Roads, Tracks, etc.

Number of employees.	Groups of actual daily earnings, or daily rate nearest to average daily earnings.		
7	Under		$0.21
14	$0.21	—	.40
365	.41	—	.60
1,275	.61	—	.80
3,270	.81	—	1.00
35,153	1.01	—	1.20
25,147	1.21	—	1.40
12,154	1.41	—	1.60
1,795	1.61	—	1.80
865	1.81	—	2.00
226	2.01	—	2.20
137	2.21	—	2.40
232	2.41	—	2.60
90	2.61	—	2.80
58	2.81	—	3.00
7	3.01	—	3.20
31	3.21	—	3.40
18	3.41	—	3.60
8	3.61	—	3.80
8	$3.81	—	$4.00
4	4.01	—	4.20
3	4.21	—	4.40
4	4.41	—	4.60
3	4.61	—	5.00
80,874	—	—	—
82		(a)	
80,956	—	—	—

(a) Rate and time cannot be stated, as they worked by the piece or trip, or combinations of these with day work.

In the foregoing table, which comprehends 80,874 employees, with pay ranging from under 21 cents per day to $5 per day, the concentration of labor is easily seen to be on those receiving from $1 to $1.40 per day. Suppose such a table should be given for a series of years. The concentration of labor, then, would show whether it was upon the higher or lower rates, or higher or lower rates than those given in the earlier years. Such a comparison cannot be made at present, because the continuation of classified wage statistics has not been sufficient to enable it to be made. I have therefore constructed a table, entirely on an assumed basis, to show how such comparison can be instituted. Let us suppose that a man begins business in 1840 with 3 employees, at $1 per day each. His business increases, and in 1850 he employs 20 people, at differing rates; in 1860 he employs 30; in 1870, 200; in 1880, 400; and in 1890, 700. How can we ascertain the increase or decrease of wages as paid in this assumed establishment? It is not an unlikely composition of forces, for such establishments can be found. The rates and the number of men at each rate are purely arbitrary, but the averages are correct. It might be further stated that the rates of pay are not out of the ordinary line of rates for different years, nor is the growth from 3 to 700 employees entirely imaginary. See table on p. 184.

Working out classified wages, with the number of men at each rate, as shown in the following table, one can see at a glance the condition of things in each of the years named. There has been a steady progress from an average of $1 per day in 1840 to $1.32½ in 1850, to $1.46⅔ in 1860, to $1.53 13/20 in 1870, to $1.68 1/7 in 1880, and to $1.90⅕ in 1890. For the purpose of comparing wages in the same establishment, where the number of employees has constantly increased, the foregoing presentation is adequate. The table was constructed, as I have said, on an arbitrary basis, and without reference to the question whether it would show an increase or a decrease in the average wages for each of the years named. It is simply an attempt to show, through a series of years, what was shown relative to railroad labor in the table next preceding the one just given. In years to come, when sufficient time has elapsed and the statistics will warrant, such comparisons can be made; and we can then determine clearly whether the course of wages has been upward or the reverse.

It is interesting to know that the later methods which have been described for the presentation of wage statistics are recognized by scientific statisticians as proper and as adequate. Dr. John Venn, in the *Journal of the Royal Statistical Society* for September, 1891, in an address on "The Nature and Uses of Averages," in remarking upon average wages, stated that "the only satisfactory plan in such a case would be to construct, say, a base line marking amounts of wages, and to set up ordinates marking the relative numbers in receipt of each such amount"; and this he would do, that the relative distribution of the

1840.	1850.	1860.	1870.	1880.	1890.
3 at $1.00	8 at $1.00	9 at $1.00	20 at $0.75	16 at $0.50	35 at $0.75
	10 " 1.50	15 " 1.50	25 " 1.00	15 " 0.75	30 " 0.83⅓
	2 " 1.75	4 " 2.00	30 " 1.25	20 " 1.00	18 " 1.00
	20	2 " 2.25	23 " 1.50	8 " 1.16⅔	12 " 1.16⅔
		30	60 " 1.75	50 " 1.25	4 " 1.25
			30 " 2.00	40 " 1.50	60 " 1.33
			8 " 2.25	5 " 1.62½	70 " 1.50
			3 " 3.00	115 " 1.75	160 " 1.75
			1 " 3.33⅓	90 " 2.00	190 " 2.00
			200	20 " 2.25	3 " 2.25
				1 " 2.75	50 " 2.50
				10 " 3.00	30 " 3.00
				4 " 3.33⅓	7 " 3.33
				6 " 3.50	12 " 3.50
				400	2 " 4.00
					10 " 5.00
					3 " 6.66⅔
					4 " 8.33⅓
					700
Average, $1.00	Average, $1.32½	Average, $1.46⅔	Average, 1.53\frac{13}{20}$	Average, $1.68⅐	Average, $1.90⅕

various amounts of wages in excess of and in defect of the mean might be shown.

But a further encouragement relative to this form of statistics comes from the International Statistical Institute, through a series of resolutions reported by the Committee on Labor, through Dr. Böhmert, at the recent convention in Vienna. The resolutions are as follows: —

> The International Institute of Statistics, on the report of the Committee of Labor, recognizing the necessity, each day increasing, for good statistics of wages,
>
> I. Is of the opinion,
>
>   (*a*) That, for the establishment of these statistics, it is not sufficient to obtain average wages, but that the actual wages paid to each laborer should be obtained.
>
>   (*b*) That we must not content ourselves with a knowledge of daily or weekly wages, but we must obtain returns showing annual earnings (or during a season for professions and industries where the labor is intermittent), with the number of hours of labor per day and number of days of labor per year.
>
>   (*c*) That it is necessary, in addition, to take account of the different modes of payment of wages and of their accessories.
>
> II. The Institute recommends the continuance or the undertaking of the collection of such statistics for certain typical establishments, and to supplement them with accounts of individual families, with budgets of their receipts and expenses, after the method and plan already approved by valuable publications, in order to render the results comparable.
>
> III. In the choice of these establishments, the Institute recommends that recourse should be had to those which are administered by, or are under the supervision of, the state, the provinces, or the communes, and to those private establishments whose chiefs wish to aid in such an investigation and are worthy of confidence.
>
> IV. The Institute recommends, wherever it is possible, to interest the laborers themselves in these statistics, and to seek to associate them in a certain measure in the enterprise.
>
> V. The Institute finally expresses the desire,
>
>   (*a*) That the learned societies proposing the methodical

collection of such statistics and monographs will develop in the different countries.

(*b*) That the governments may be willing to create bureaus of labor on the plan of those of the United States, where these offices do not exist, either creating a distinct bureau or utilizing the organization of existing bureaus of statistics.

It is not too much to assume that the experience of American statisticians in their trials with wage statistics prompted the introduction and the unanimous adoption of the foregoing resolutions. As foreign governments are now following the example of American States in establishing bureaus of labor and departments of labor, it is reasonable to hope that uniform wage statistics will be recognized, not only as desirable, but as scientifically essential for just and accurate comparisons; for it is true that, until some common method of presenting wage statistics shall be recognized as essential by the great countries devoted to mechanical enterprise, the exact variation in the earning capacity of the people of these countries cannot be measured. Until such common method is adopted, it is possible to make a fairly legitimate comparison by rates of wages only, but they should be for specific occupations. If for a cotton mill the rate of wages paid to a particular grade of spinner through a series of years could be ascertained, or the wage of a journeyman carpenter, or of a cutter in a shoe factory, or for any well-defined occupation or subdivision of an occupation a fairly accurate comparison, as of one period with another, could be made, so where actual earnings stated by the week or the day are the results of true averages, the total number of people in a given occupation being comprehended in securing the average, a comparison is fairly legitimate.

Much depends, in making comparisons of wages, whether the purpose of the comparison is a social or an economic one. If the purpose is purely economic, I am quite well satisfied that positions only, without regard to the number of men occupying the positions, offer the best basis for accurate conclusions. For instance, on a given railroad it requires a certain number of brakemen, of conductors, of baggage-men, etc., to carry on the traffic of the road. Now, for economic purposes, it does not matter how many individual brakemen may have been employed during the year: it is the question of the actual number necessary for the proper equipment of the road. In a cotton mill there may be fifty spinners and two hundred weavers necessary for the conduct of the work; that is, essential to preserve the integrity of operations. Then the wages earned in these fifty positions of spinners and two hundred positions of weavers offer the best opportunity for purely economic consideration. If the purpose for which the wage statistics are to be used be social, then the classified basis which has been described, and which has been so well developed in this country, probably offers the very best method that can be adopted. Of course, it should be understood that all methods may be used, either for social or economic considerations.

I have not, in the foregoing consideration, taken any pains whatever, nor has it been my purpose, to consider the economic laws relating to wages, or to discuss in any way what makes the rate of wages, or what may be called economic wages as against actual earnings. I have confined myself simply and solely to the consideration of the best methods of presenting wage statistics after they are gathered, and with the hope of contributing a little to the efforts being made to secure uniform presentations.

CARROLL D. WRIGHT.

NOTE.— The official statistics of wages for foreign countries (continent of Europe) are to be found as indicated in the following statement, which has been kindly furnished me by Dr. Roland P. Falkner, of the University of Pennsylvania: —

OFFICIAL STATISTICS OF WAGES IN FOREIGN COUNTRIES.

France.— Such statistics do not exist, but they will be collected by the newly created *Office du Travail.*

Italy.— The Director of Statistics has published two brief attempts at wage statistics in the series *Annali di Statistica,* 4th series vols. 14 and 26. The last is that treated of by Dr. Grüber.

Denmark.— Such statistics have never been collected.

Sweden.— Such statistics do not, properly speaking, exist. Every year there is published a "Statistics of Salaries and Pensions," which gives the salaries of all public servants, but does not group them.

Austria.— A search through the *Statistische Monatschrift* fails to discover any statistics of wages collected in Austria. In a recent publication there is a bare statement of the wages of daily labor for a series of years.

Holland.— One of the most recent issues of the Statistical Institute makes an attempt at wage statistics. It summarizes a previous investigation of 1884–85 on the wages of agricultural labor. The following distinctions were made: —

1. Full-grown man living with employer.
2. Full-grown woman living with employer.
3. Full-grown man not with employer.
    - (*a*) with free dwelling and *Garten.*
    - (*b*) without the above.
4. Occasional workmen.
5. Overseers (foremen).

The wages tabulated by provinces were the highest permanent and the lowest government rate; but from the text it is not clear what rates were asked. It seems, however, as if the inquiry was for the average. For industrial wages circulars were sent out requesting the *average wages* from 1875 to 1885 for the various categories of workmen. In combining the facts thus gained, the compiler tabulates the number of workmen, the highest average, and the lowest average wage. Where either refers to an especially large or especially small number, he adds this in parenthesis.

In two cases, pay-rolls were given to him. In this case, he gives for each grade of workmen the number and the average wage, and, further, the rate most frequently paid and the number receiving that rate.

Germany.— The Imperial Statistical Office has not touched on the subject of wages.

The same is true of the Prussian Statistical Bureau. The only treatment of wages to be found in the *Zeitschrift* of the bureau is in an article on the "Price of Wood and Agricultural Labor in the State Forests." The tables give the wages paid in each district in five periods,—1840–49, 1850–59, 1860–69, 1870–74, 1875–79.

The Bavarian Statistical Bureau and the Saxon Bureau have published nothing on wages.

On the contrary, some of the communal bureaus have taken up the question. There is a publication, *Lohnverhältnisse in Berlin*, by the Berlin Bureau; but I have not yet seen it.

Switzerland.— A search through the *Zeitschrift* for wage statistics was fruitless. In 1874 Dr. Böhmert, then head of the bureau, published an article on the "Method of Social Investigation." In this he shows how wage statistics should be founded on payrolls, should distinguish the different rates of payment and the sexes. He illustrates with the figures for one or two factories in Switzerland.